Summary Sheet

Goal Directed Fluid Strategies

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Three main perioperative goal-directed fluid strategies exist:

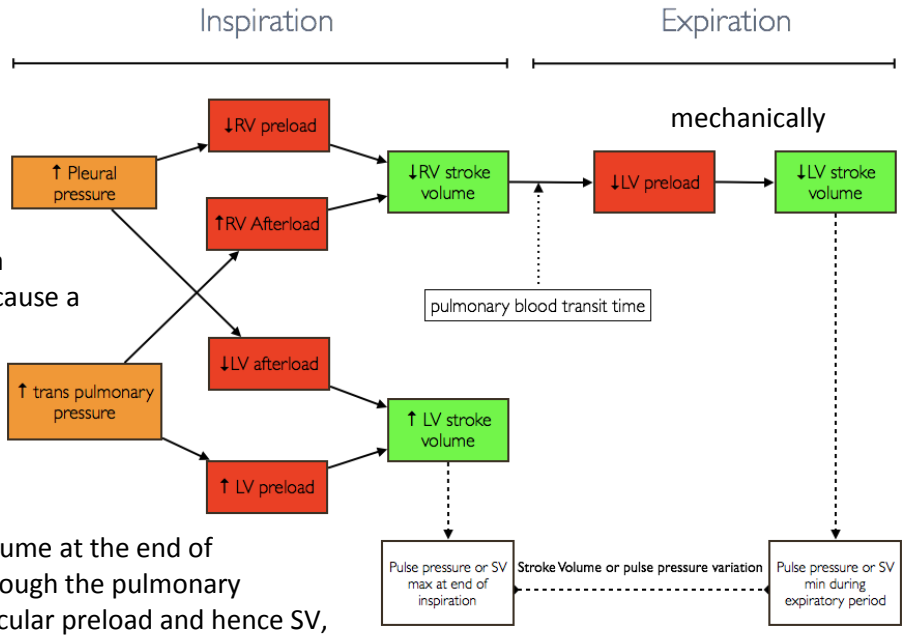
1. Stroke volume optimisation
2. Minimisation of preload responsiveness parameters such as stroke volume variation (SVV), pulse pressure variation (PPV) and pleth variability index (PVI) with fluid.
3. Targeted oxygen delivery with fluid and inotropes

Stroke Volume optimisation

Stroke volume optimisation involves giving small boluses of fluid (200-250ml) in order to ascend the steep portion of Frank starling curve until it reaches the plateau, and stroke volume is maximised.
Inserted animated frank starling curve.

Minimisation of preload responsiveness parameters

Dynamic or fluid responsiveness parameters (PPV/SVV) assess the likelihood of an individual to increase their stroke volume in response to a fluid bolus *without* having to actually to give fluid to see if there is a response. This is the fundamental difference from stroke volume optimisation. The change in SV or pulse pressure over a respiratory cycle is shown below.



Measures of preload responsiveness rely on the changes in stroke volume over a ventilated respiratory cycle. A positive pressure breath cause an increase in pleural pressure and trans pulmonary pressure, and these changes, ultimately via changes in ventricular pre and afterloads, cause a decrease in right ventricular stroke volume and an increase in Left ventricular stroke volume such that at the end of inspiration LV stroke volume is maximised as is pulse pressure.

The decrease in right ventricular stroke volume at the end of inspiration, after the blood transit time through the pulmonary circulation, causes a decrease in left ventricular preload and hence SV, so at the end of expiration SV is at its minimum (as is PP).

The difference between the maximum SV or PP at the end of inspiration and the minimum at the end of expiration is called SVV or PPV and is a very good predictor of fluid responsiveness. Essentially each mechanical breath is like a fluid challenge.

Targeted oxygen delivery

Targeting oxygen delivery first involves maximising stroke volume with fluid and at that point oxygen delivery is calculated :

DO_2 = Cardiac Index x CaO_2

Where CaO_2 = (Hb x 1.39 x SaO_2) + (PaO_2 x 0.003)

If DO_2 is less than 600mL/min/m^2 then inotrope such as dobutamine is added to increase the CI and hence oxygen delivery (assuming normal SaO_2 and Hb).

Example of the various protocols and the evidence behind them are available from the European Society of Anaesthesia to download (www.esahq.org).